**Science Olympiad Cobra Invitational 2017, Food Science Exam**

**SCHOOL #\_\_\_\_\_\_\_ SCHOOL Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**NAMES: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Part 1. Question and Answer (85% of overall score) Mark an “X” to choose your multiple-choice answers. Write all other answers in legibly in the space provided. Erase all unwanted marks or they could be counted against your score.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_ \_ | c. \_\_\_\_X\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_X\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_X\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_X\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_X\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | 27 Calories |  |  |  | 2 pts | | | |
|  | 4 Calories |  |  |  | 2 pts | | | |
|  | 35 Calories |  |  |  | 2 pts | | | |
|  | 80 mg |  |  |  | 2 pts | | | |
|  | 8% |  |  |  | 2 pts | | | |
|  | 300 ml |  |  |  | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_X\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_ \_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_X\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_X\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | e. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_X\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | e. \_\_\_\_X\_\_\_\_\_ | | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_X\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_X\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_X\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_X\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_X\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | Milk, egg, peanuts, tree nuts (such as walnuts or pecans), wheat, soy, fish, and shellfish (such as lobster, shrimp or crab). (1 point per right answer | | | | 8 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_X\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_ | 2 pts | | |
|  | Potatoes, squash and papaya (1 point per right answer) | | | | 3 pts | | | |
|  | a. \_\_\_X\_\_\_\_\_\_ | b. \_\_\_\_\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. \_\_\_\_\_\_\_\_\_\_ | b. \_\_\_X\_\_\_\_\_\_ | c. \_\_\_\_\_\_\_\_\_\_ | d. \_\_\_\_\_\_\_\_\_\_ | 2 pts | | | |
|  | a. Oatmeal,  c. popcorn,  e. quinoa,  h. cracked wheat (1 pt per right answer) | | | | 4 pts | | | |
|  | b. sugar | | | | 1 pt | | | |
|  | f. Oil, salt | | | | 1 pt | | | |
|  | e. pasteurization | | | | 1 pt  1 pt | | | |
|  | c. citric acid | | | | | | | |
|  | 0.8 g/cm3  2 pts | | | | | | | |

**Part 2. Calorimetry Experiment (15% of overall score) \**

Each student team is provided with Cheetos. Make sure you are following safe lab procedures. Clean up your station.

Using your student-built, non-electric calorimeter, determine the energy content of a Cheetos.

Provide your answer in Calories/gram. Show your work for maximum credit.

Your Calorimetry unit efficiency

Please explain what experiment did you perform (at home/school) to arrive at this efficiency value **( 3 pts)**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

CALORIMETRY **( 8pts)**

Water volume Water weight ­

Sample initial weight Water initial temperature

Sample final weight Water final temperature

Sample weight change Water temperature change

Heat capacity of water = 1 calorie/gram \* °C

**Energy content of Cheetos (4 pts including work)**

**Show your work here:**